

**REMARKS**

Claims 18-49 are pending in the application. Claim 20 has been cancelled. Claims 47-49 are newly presented. Claims 35 and 36 have been allowed. Independent claim 18, and dependent Claims 32 & 39 have been amended to distinguish over the prior art cited in the office action by the examiner.

***Claim Rejections – 35 USC § 112***

Claims 33, 34 and 41-46 are rejected under 35 USC 112, second paragraph, as being indefinite as set forth at page 2 of the Office Action. The foregoing claims have been amended to obviate the rejection raised by the examiner. Therefore, the foregoing claims should be held allowable.

***Claim Rejections – 35 USC § 103***

Claims 18-24, 26, 28-30, 32, and 37-40 were rejected under 35 USC 103(a) as being unpatentable over USP 6,854,897 to Furumai et al. (hereinafter "Furumai") in view of USP 5,923,805 to Anderson et al. (hereinafter "Anderson"). The claims have been amended to distinguish over the prior art cited by the examiner, and the rejections are respectfully traversed.

The following discussion shows that the rejected claims according to this amendment patentably distinguish over the applied references to Furumai and Anderson.

***Independent Claim 18***

Claim 18 has been amended to recite in part, "light-collection rods of refractory material for receiving light from high-temperature light source through a non-imaging collector." Claim 18 further refers to light pipes, which can be seen from the claim to be for receiving light from said *high-temperature* light source. The light is received from the high-temperature light source by the light-collection rods of "refractory" material through a *non-imaging collector* (emphasis added). See specifications at page, lines 3-20 for the description of light-collection rods of refractory material, high-temperature light source and non-imaging collector. Refractory is defined as "the quality of a material to retain its strength at *high temperatures*" (emphasis added). [www.wikipedia.org/wiki/Refractory](http://www.wikipedia.org/wiki/Refractory) (visited on August 13, 2007).

In contrast, Furumai and Anderson taken alone or in combination do not teach or suggest the presence of a high-temperature light source. Moreover, they do not teach or suggest the presence of any light-collection rod made from refractory material which collects light through a non-imaging collector.

For the foregoing reasons, Claim 18 would not have been obvious to a person of ordinary skill in the art at the time the invention was made.

#### *Dependent Claims*

Further, Applicants point out that dependent claims deriving their dependency from Claim 18 recite additional features of the claimed invention so as to distinguish over the cited prior art with more force than Claim 18. For instance, newly added Claim 51 recites that "the rod hub arranges light-receiving ends of said light-collection rods in a manner such that each of the light-receiving ends receives light rays traveling from said light source in respective straight lines." The prior art is completely devoid of this feature.

Additionally, the following discussion of dependent claims lays out further distinguishing features of the claimed arrangement from the prior art.

#### *Claim 29 (Re: Thermal Issue)*

The examiner has rejected Claim 29, which recites, "the light pipe hub is made of plastic," as being obvious over the applied art. The examiner suggests that a person of ordinary skill in the art would find it obvious to modify Furumai's sleeve 12 (Fig. 1) to be made of plastic since plastic is "durable." However, as the following shows, plastic would in fact not be durable for Furumai's relatively tiny communication module, and, further, Furumai would lack motivation to form his sleeve 12 from plastic.

Reliability of communication in Furumai's communication module would suggest manufacturing the module from metal, not from plastic as the examiner suggests. This is due to the small size of the communication module and the intricate shapes and structures involved. Such small size and intricate shapes would be difficult to realize

with plastic, due to the significantly larger dimensional tolerances of plastic parts. Furumai's cross hatching of sleeve 12 (e.g., Fig. 1), in fact, does show that sleeve to be made from metal.

Additionally, Furumai did not have the need for making sleeve 12 from plastic for thermal-isolation purposes, as did Applicants. That is, Applicants made their light pipe hub from plastic to thermally isolate plastic light pipes from the "high-temperature light source" of base Claim 18. (Specification at page 12, lines 28 to page 13, line 28.) This prevents thermal degradation of plastic light pipes (e.g., melting). Furumai does not teach a high-temperature light source, and so would lack a similar thermal-isolation purpose for making sleeve 12 from plastic.

For the foregoing reasons, Claim 29 would not have been obvious to a person of ordinary skill in the art at the time the invention was made.

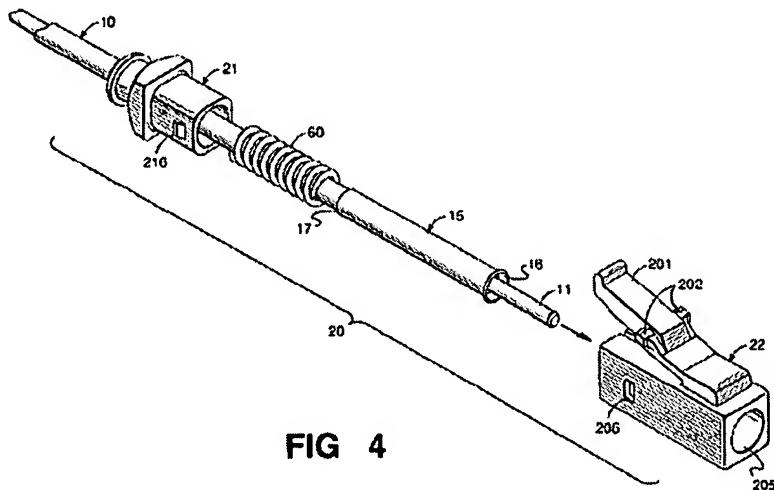
The examiner rejected Claim 30, which recites, "the plug is made of metal," as being obvious over the prior art. The examiner suggests that a person of ordinary skill in the art would find it obvious to make Furumai's optical coupling device 80 (Fig. 3) from metal since metal is highly machinable. However, the optical coupling device 80 has a simple shape and does not require high machinability as would be required of other parts of Furumai's communications module (see Fig. 2). So, making it of plastic—which the examiner says is "inexpensive and durable material" (Office Action at 4)—would be apparent to a person of ordinary skill in the art. Secondly, since Furumai's device lacks the "high-temperature light source" of base Claim 18, Furumai lacks the need to employ the claimed feature of the plug being made of metal. Metal is employed for the plug in the claimed invention where "additional cooling of the light pipes is needed." Specification at page 13, lines 27-28.

For the foregoing reasons, Claim 30 would not have been obvious to a person of ordinary skill in the art at the time the invention was made.

**Claims 28 and 47 (Re: Difference in the structure of the plugs)**

The plug in the claimed arrangement is a single unit. The foregoing difference in the structure is distinguished by the newly added **Claim 47** which recites that, "the fore end of the plug is *integrally joined* to the aft end of the plug." (Emphasis added). This feature of the claimed invention is inherent from Fig. 14 and its accompanied description at page 15, lines 8-14 of the specifications. Additionally, amended **Claim 28** adds, "a *continuous* interior channel in the plug for receiving the light pipe has an increasing diameter from the fore end to the aft end of the plug." This is supported by the specifications at page 7, lines 29-30. The foregoing features of the claimed arrangement define a taper in the increasing diameter of the interior channel. The taper has various purposes: It aids in the ejection of the final molded plug from a fabrication mold, for instance. See specification at page 7, line 29 to page 8, line 8.

In contrast, Anderson has a two part plug, which can be seen from the following figure:



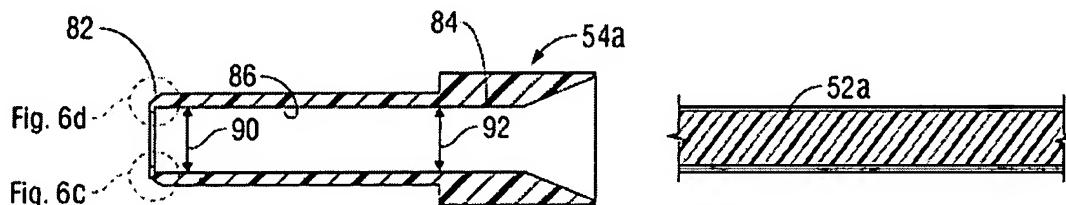
**FIG 4**

**Claim 28 (Re: Interior plug geometry)**

The examiner has rejected **Claim 28** as being obvious over Furumai in view of Anderson. **Claim 28** that reads upon Fig. 6b (produced below) recites, "an interior

channel [86] in the plug for receiving the light pipe [52a] has an increasing diameter from the fore end [82] to the aft end [84] of the plug [54a].” As stated above, diameter 92 at the aft end 84 of the unitary plug (54a) is greater than the diameter 90 at the fore end 82 of the plug.

This feature, among others, aids in causing a slight compression on the light pipe 52a, which helps to create a seal between the light pipe 52a and the plug 54a at the fore end 82 of the plug. This feature of sealing of the light pipe 52a helps prevent any glue (used for adhering light pipe 52a to the plug 54a) from flowing out of the fore end 82 of the plug 54a. This feature is supported by the following figure and the description of the claimed arrangement at page 8, lines 2-11 of the specification.



In contrast, both Furumai and Anderson taken alone or in combination do not teach or suggest this feature.

#### ***Claim 32 (Re: Walled Cavity)***

The examiner has rejected Claim 32 as being obvious over Furumai in view of Anderson. Claim 32 has been amended to recite, “the aft end of the plug has a walled cavity facing away from the light pipe hub for mounting a device for protecting the light pipe.” As shown in the following figure, the walled cavity is facing away from the light pipe hub in order to mount a device for protecting light pipe. This is disclosed by Specification at page 9, line 29 to page 10, line 8.

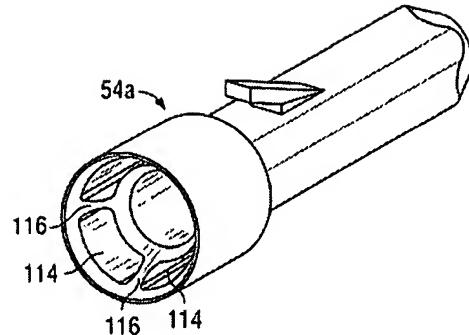


FIG. 7a

The claimed walled cavity in Claim 32 also facilitates other devices to be mounted on the plug indirectly via an adapter (118) as is shown in the following Fig. 7b:

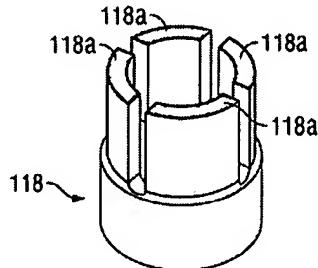


FIG. 7b

The adapter shown in the foregoing figure allows different devices to be mounted on the plug that act as a strain relief device. Specification at page 10, lines 12-28. For instance, as shown in the following Fig. 9a:

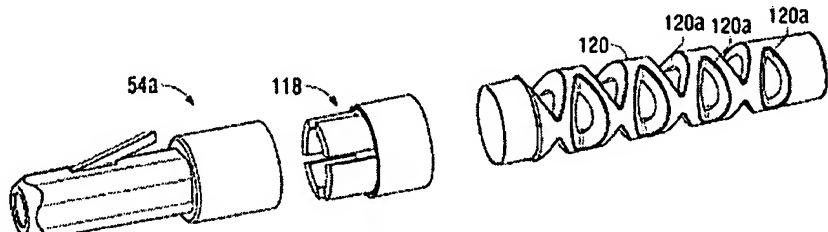


FIG. 9a

On the other hand, Anderson does not teach or suggest the presence of any such cavity that faces away from the light pipe hub. The examiner has equated cavity

22 in Fig. 2 of Anderson to the claimed "walled cavity." Anderson's cavity neither faces away from the light pipe hub nor does it facilitate any adapter to be mounted on the plug. Furumai also does not teach or suggest this feature.

***Claims 39 (Re: Direction for compression of light pipe)***

The examiner has rejected Claim 39 as being obvious over Furumai in view of Anderson. Claim 39 has been amended to recite, "said portion of the light pipe is held within the plug with the aid of radial compression with respect to said longitudinal axis."

In contrast, Anderson uses spring 60 (Fig. 6) to cause plastic optical fibers 11-1 & 11-2 (Fig. 6) to press against each other—that is, the optical fibers have longitudinal compression, for instance. See Col. 7, lines 7-10 and Fig. 6 of Anderson.

***Claim 25 (Re: O-ring)***

The examiner has objected to Claim 25 as being dependent upon a rejected base claim. The examiner allowed Claim 25 if rewritten in independent form including all the limitations of the base claim and any intervening claims. Claim 25 has been thus presented in a new independent Claim 50.

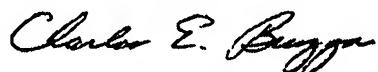
***Conclusion***

For the foregoing reasons, the pending claims, and the application, should be allowed.

I certify that the foregoing document and any document(s) referenced below are being filed electronically with the USPTO using the private PAIR system on the date stated below.

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Respectfully submitted,



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